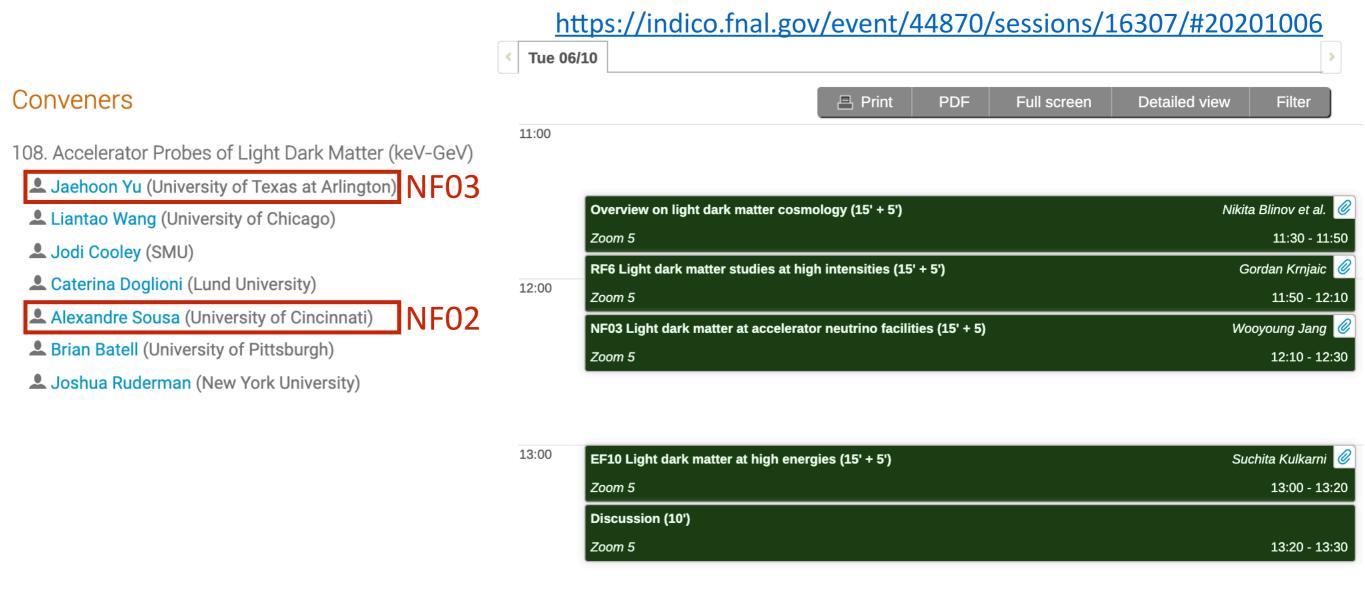
108. Accelerator Probes of Light Dark Matter (keV-GeV) Snow Mass 2021





- Provide overview of the complementary activities on low-mass dark matter (LDM) across NF, RF, and EF, and discover, create, and promote new joint activities.
- Target outcome was to identify discussion points and ideas to continue developing together throughout the Snowmass process and beyond
 - Work towards one LDM white paper across all frontiers

See also CPM sessions #72, #97, #127, #136, #173 for complementary discussion

Questions to Address



- ▶ How do we best promote inter-experimental efforts to identify and combine complementary measurements to maximize sensitivity to discovery?
 - Across accelerator experiments (Meson factories, Neutrino experiments, Beam dumps, Missing Energy/Momentum, LHC,...)
 - Accelerators vs. cosmic probes (direct detection, cosmic ray, neutrino telescopes, CMB, ...)
- What simulation tools are required for near-future accelerator searches?
 - Dedicated tools (e.g., BdNMC for LDM generation at fixed-target expts.), Multi-purpose generators (e.g., Pythia, Madgraph5_amc@NLO), hybrid tools (DM module in GENIE)
 - Joint theory/experiment effort (e.g. model-specific production/scattering/decay, simulation of neutrino beam line, ...)
 - Interpretations for a variety of LDM models (e.g., building model catalog for Madgraph5, ...)
- In the event of a light dark matter discovery (!!!):
 - What experiments are needed and what are the prospects for measuring the properties (masses, couplings) of DM particles and mediators?
 - How do we evolve the present program to make precision measurements of DM properties?
 - → Pursue new ideas to minimize neutrino backgrounds for DM searches at acc. expts

Practical Work and Action Items Snow Mass 2021

- Continue developing a standardized set of physical limits for sensitivity plots and promote their use across relevant experiments
 - e.g., DM relic densities, minimal portal models, thermal targets in vector portal models, ...
 - Broader discussion on light dark /dark sector benchmarks is underway during Snowmass 2021
- When feasible, encourage experiments to produce well-documented and comprehensive data releases:
 - Essential step to enable effective inter-experimental efforts
 - Would allow quicker and accurate interpretation of experimental results within the very diverse landscape of DM theoretical models by the community.
- Survey existing generator tools, identify where improvements / additions needed, merge tools if appropriate, create new tools, ...
- ▶ Theory/pheno/experiment studies of discovery scenarios :
 - What experiments/measurements are needed? Experimental agenda, possible timelines, ...
 - Highlight complementarity of different experiments, bolster LDM science case!
 - See also DOE Basic Research Needs Dark Matter Small Projects New Initiatives Report
 https://science.osti.gov/-/media/hep/pdf/Reports/Dark_Matter_New_Initiatives_rpt.pdf